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ABC's of Meteorology

REFERENCES

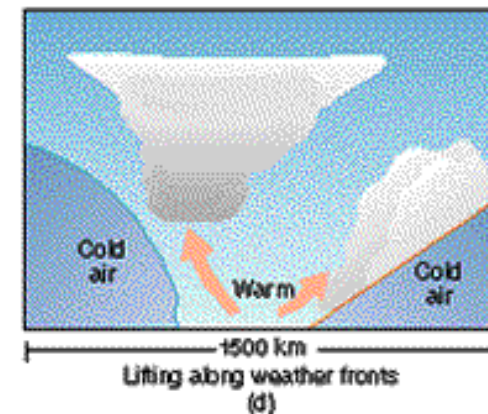
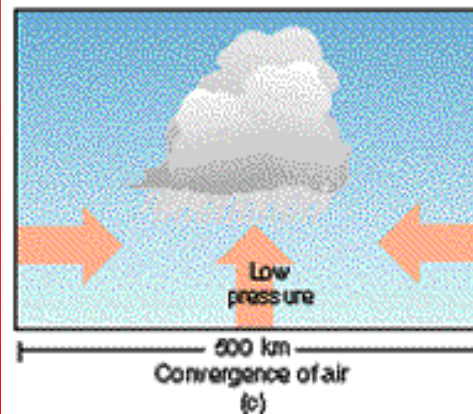
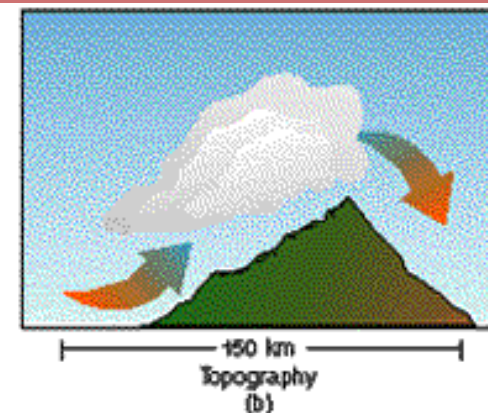
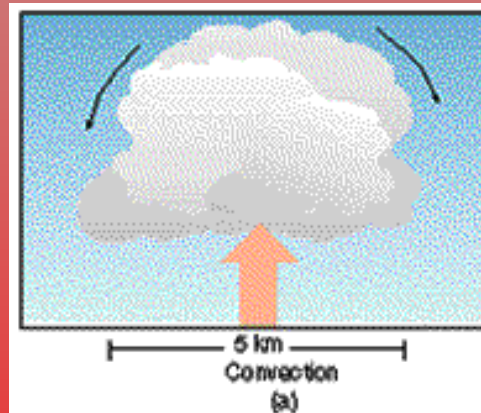
- **Meteorology Today**
- **AG2 Vol. 1**
- **AG2 Vol. 2**
- **Forecaster's Handbook**
- **AG Mod 5**

TOPICS of DISCUSSION

- **Cloud Formation**
- **Heat Transfer in the Atmosphere**
- **Air Masses**
- **Fronts**
- **The Three Cells**

CLOUD FORMATION

- **Convective Lifting or Convection** - ascending air caused by strong heating at the Earth's surface.
- **Orographic Lifting** - air that is forced upward by mountainous terrain.
- **Convergence** - air that is forced upward by convergence of air near the ground. A trough line, depicted on a weather map as a dashed line, identifies a line of convergence at the surface.
- **Frontal wedging** - a process by which air is forced upward by the displacement of one airmass by a different airmass. This process occurs near cold fronts, where cold



Heat Transfer in the Atmosphere

Advection

- Horizontal movement of air, moisture, or heat.

Convection

- Vertical movement of air, moisture, or heat.

Conduction

- Transfer of heat by molecular activity from one substance another, or through a substance. Transfer is always from warmer to colder regions.

Radiation

- The transfer of energy through electromagnetic waves.

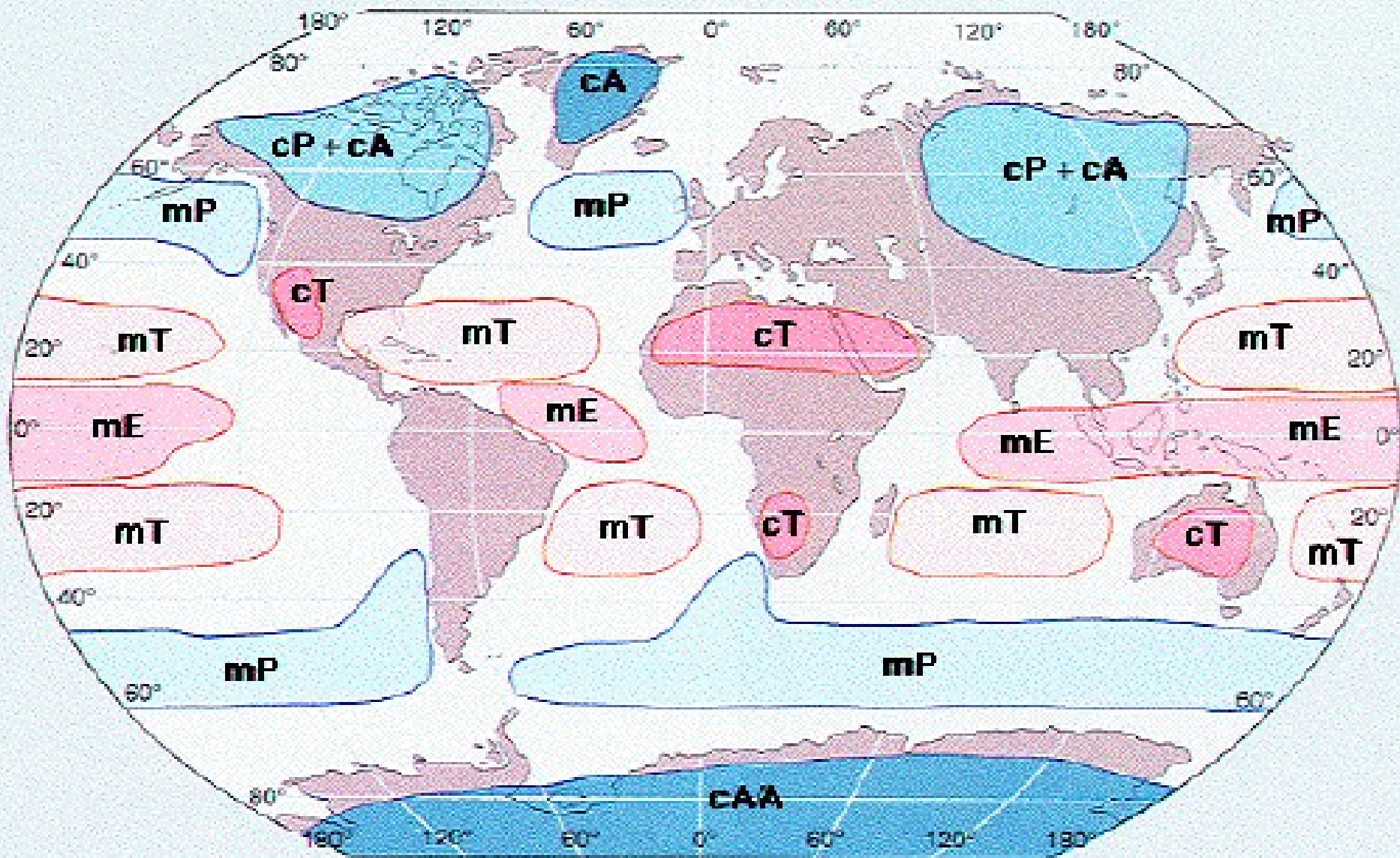
Latent Heat Transfer

- Heat that is released/ absorbed by a unit mass of a substance when it undergoes a change of state, such as during evaporation, condensation, or sublimation.

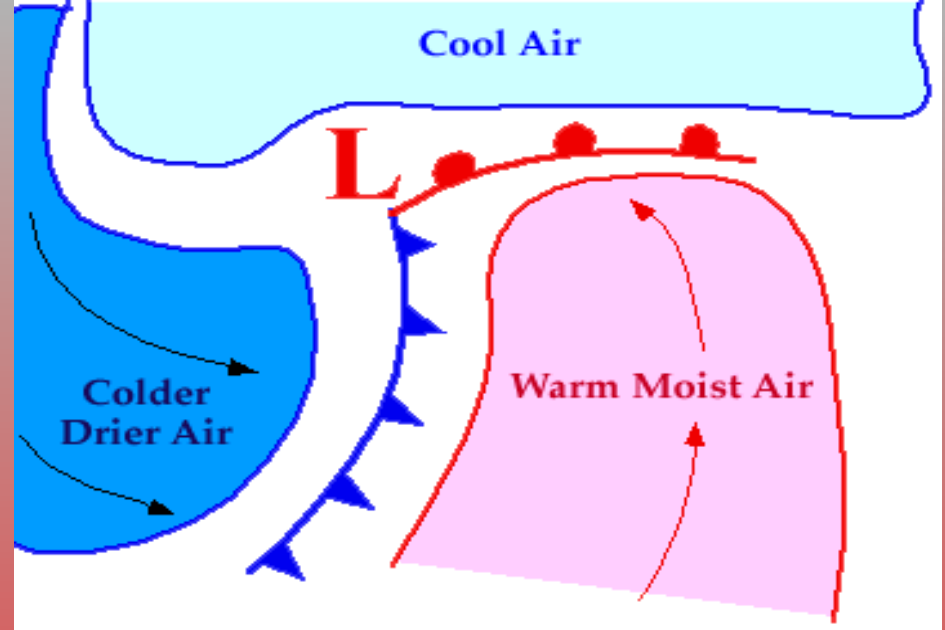
Air Masses

- A widespread body of air that is approximately homogeneous in its horizontal extent, with reference to Temperature and Moisture

AIR MASS SOURCE REGION



FRONT

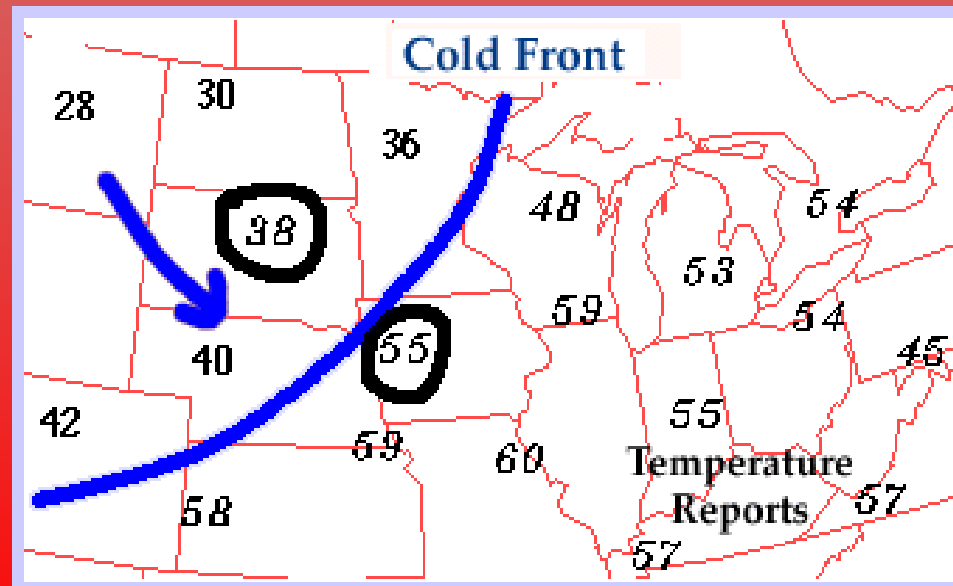
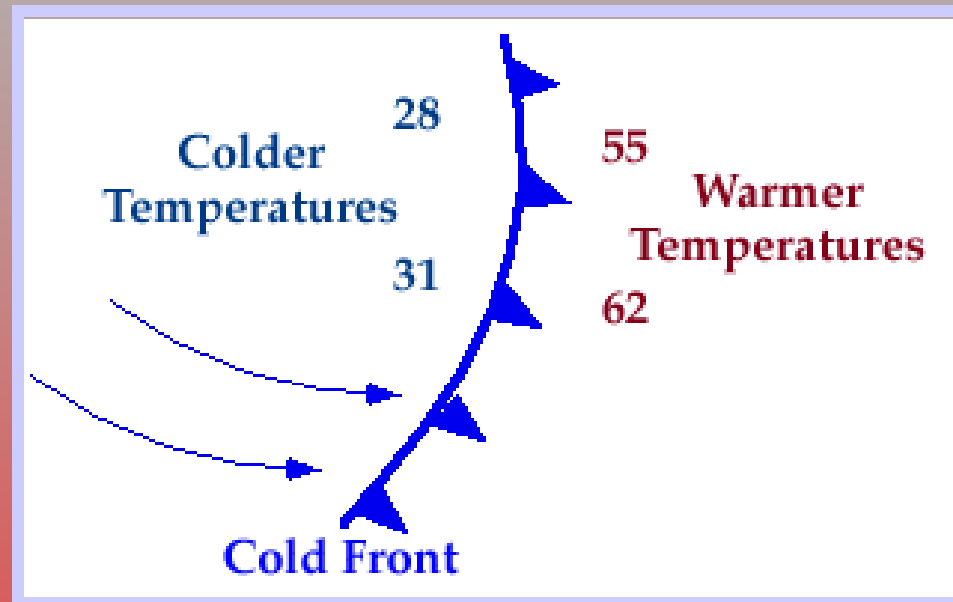


Transition zone between air masses with different weather characteristics.

Criteria used to locate a Front on a Surface Weather map:

- 1. Sharp temp. changes over a relatively short distance.**
- 2. Changes in the air's moisture content (as shown in marked changes in the dew point)**
- 3. Shifts in wind direction**
- 4. Pressure and pressure changes**
- 5. Clouds and precipitation patterns**

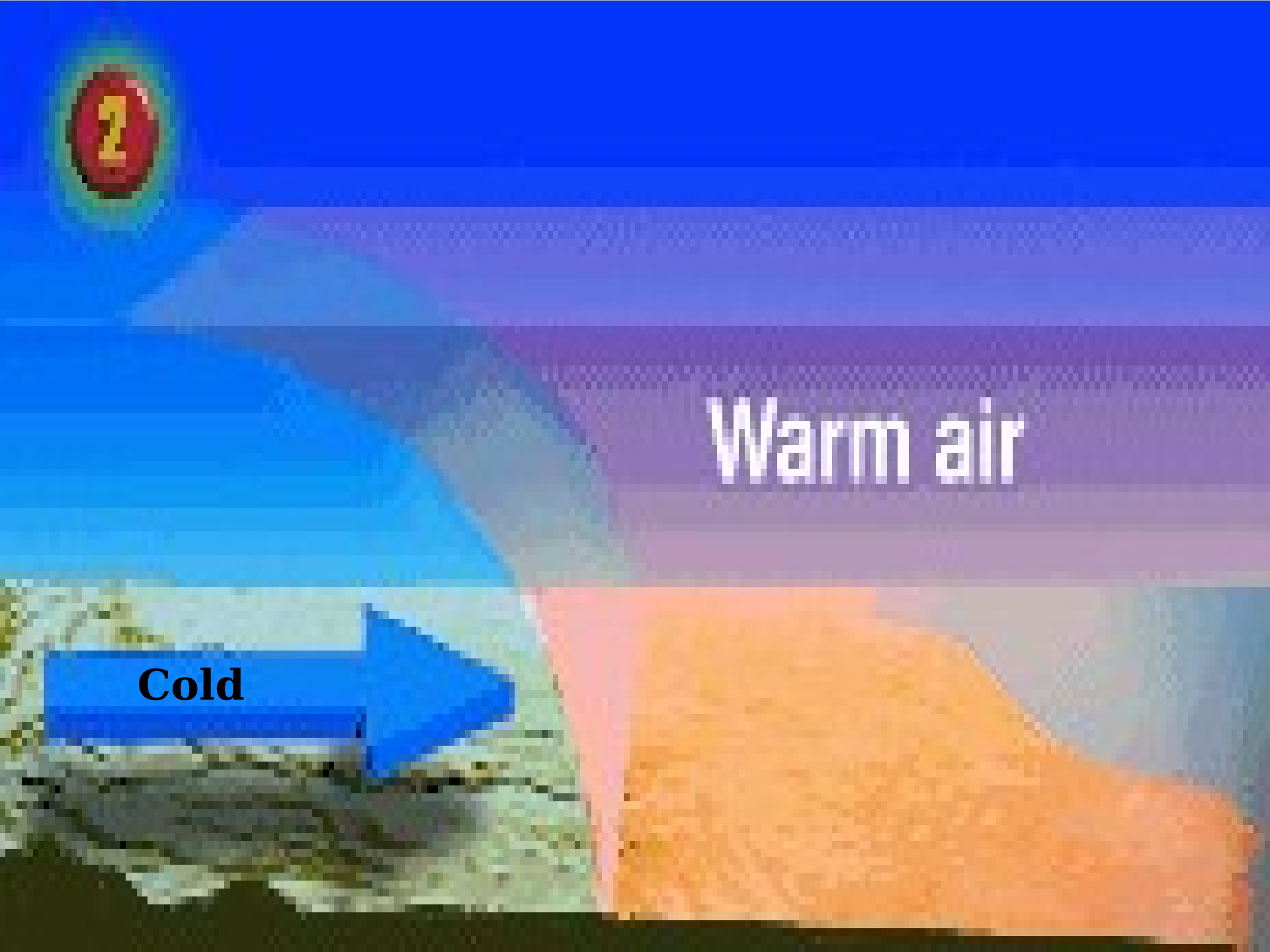
A cold front is the leading edge of a cold air mass that is under-running warm air



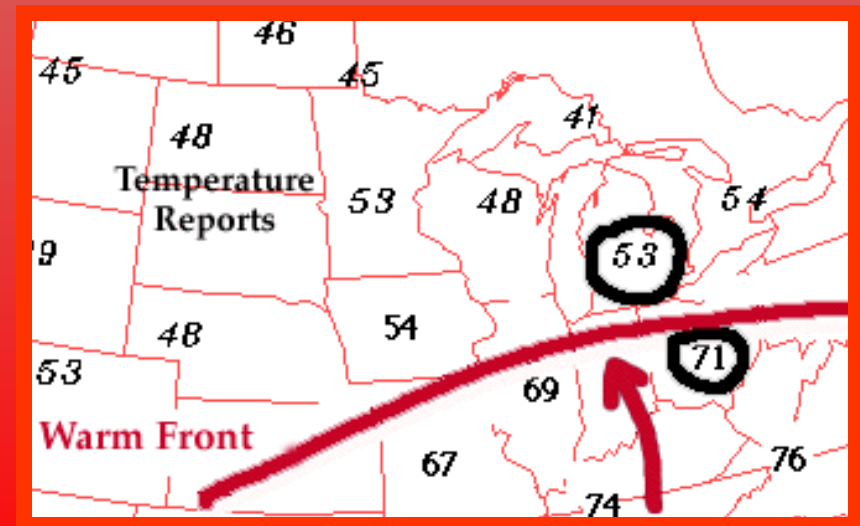
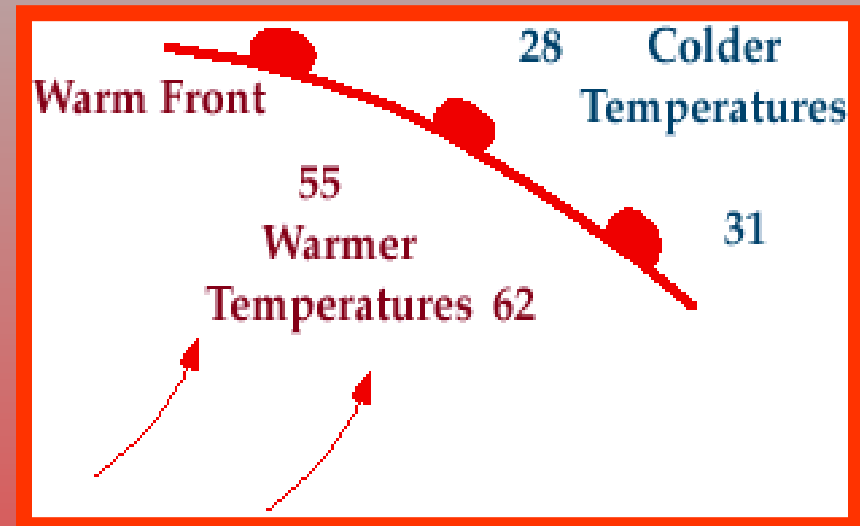
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Warm air

Cold



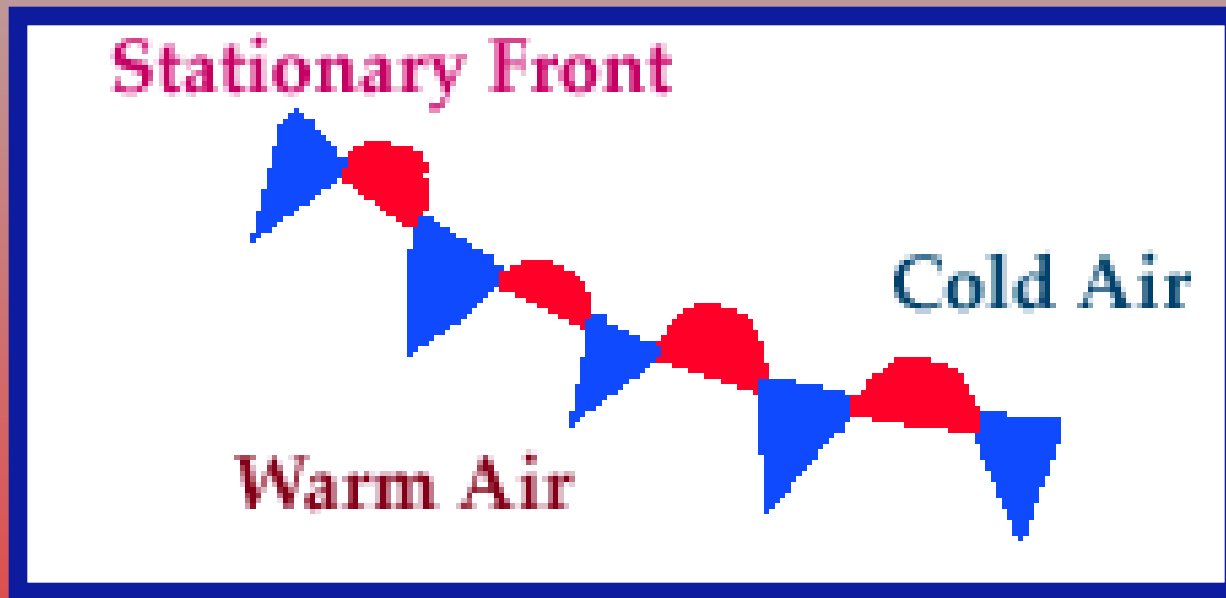
A warm front is the line of discontinuity where the forward edge of an advancing warm air mass is replacing a retreating, relatively colder air mass.



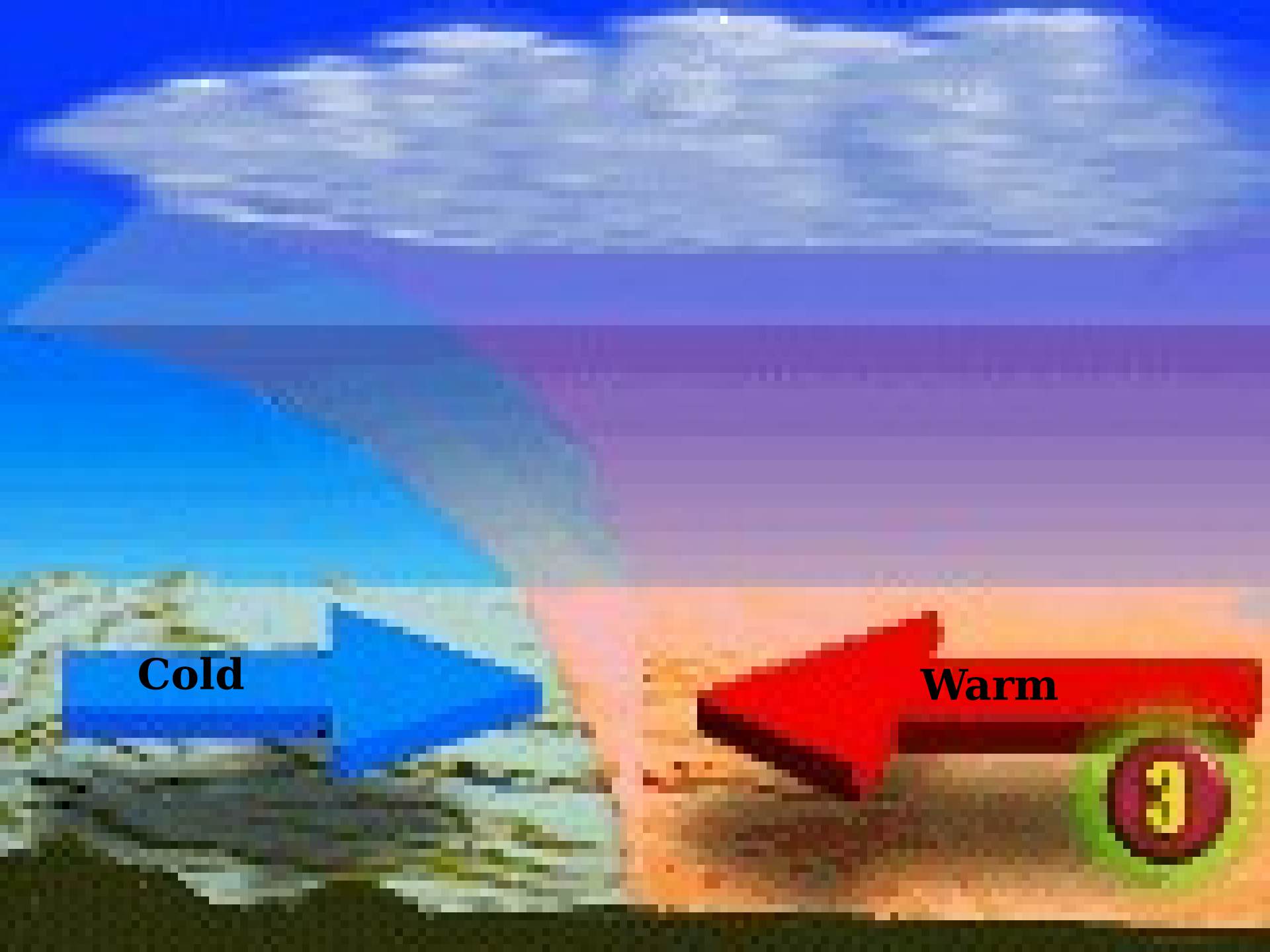
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Warm

Cold



A stationary front has essentially no m



Cold

Warm

3

An occluded front is a composite of two fronts. They form when a cold front overtakes a warm front and one of these two fronts is lifted





A cold occlusion is the occlusion that forms when a cold front lifts the warm front and the air mass proceeding the front.

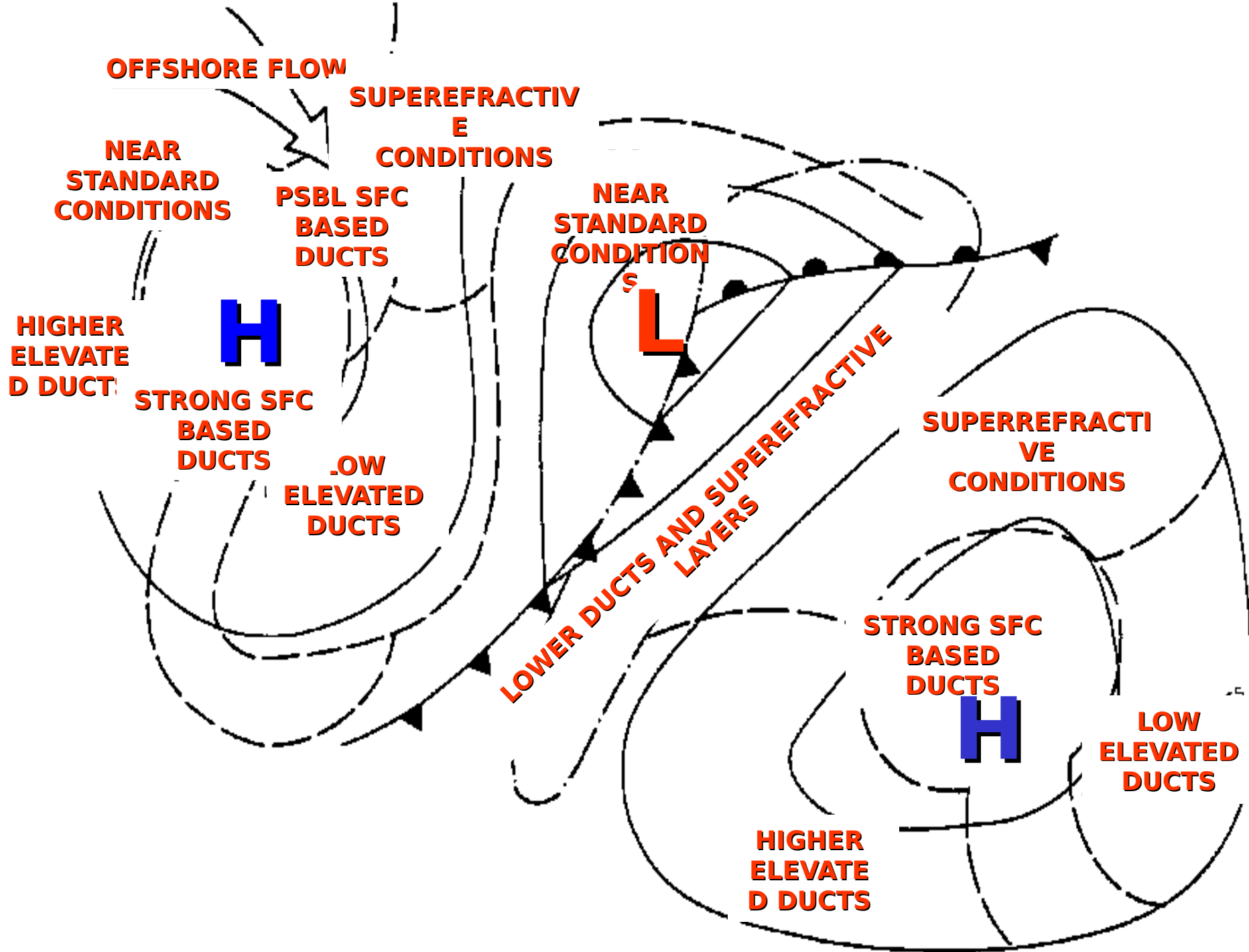


A warm occlusion is the occlusion that forms when the overtaking cold front is lifted by over-running the colder retreating air associated with the

Air Mass Modification

5 factors

- Temperature
- Surface
Moisture
- Surface
Topography
- Trajectory
- Age



THE THREE CELLS

POLAR CELL

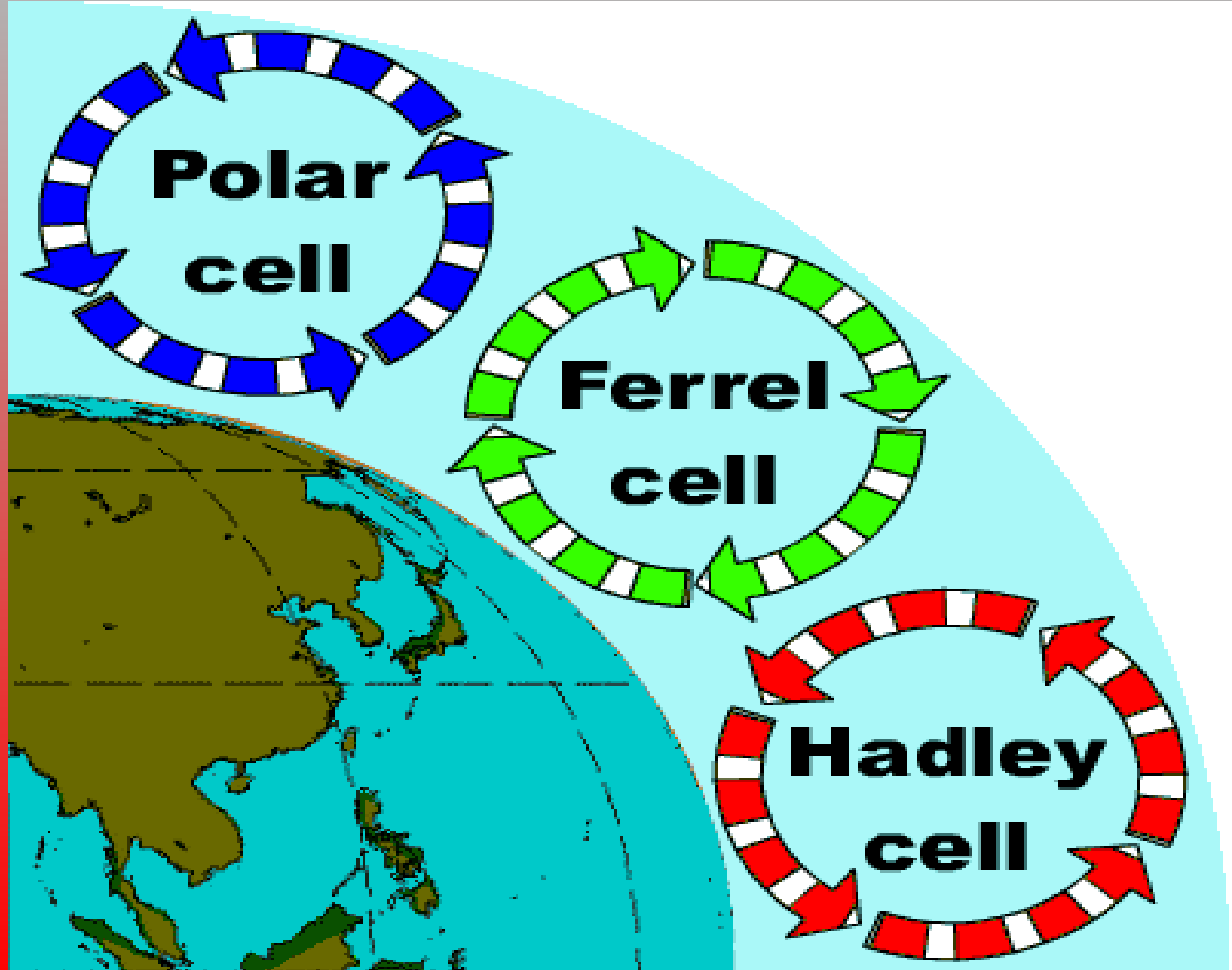
- Three-dimensional atmospheric circulation cell located at roughly 60° to 90° N and S of the equator.
- Mid-latitude cells in both hemispheres are termed the Ferrel Cells.
- Cold, dense air descends in a polar high-pressure system and moves toward the equator.

FERREL CELL

- Named after the American meteorologist William Ferrel.
- Three-dimensional middle latitude cell located at roughly 30° to 60° N and S of the equator.
- Reverse circulation in these cells results from the air flowing toward the poles from the subtropical highs which collides with cold air flowing from the Poles.
- The zone of convergence is the polar front.

HADLEY CELL

- Named after the 18th century English meteorologist George Hadley.
- Low latitude air movement toward the equator that with heating, rises vertically, with poleward movement in the upper atmosphere.
- Forming a convection cell that dominates tropical and sub-tropical climates.



Coriolis Effect

- The Coriolis effect was first introduced by a French mathematician named Gaspard Coriolis in the early 19th century.
- Tendency for any moving body on or above the earth's surface to drift sideways from its course because of the earth's rotational direction (west to east) and speed, which is greater for a surface point near the equator than toward the poles.
- In the N. Hemisphere the drift is to the right of the motion, with storms or cyclones rotating counterclockwise.
- In the S. Hemisphere the drift is to the left of the motion, with storms or cyclones rotating clockwise.

Jet Stream

- Jet streams are bands of very strong upper level winds which occur at limited altitudes.
- They can be over 150m wide and 1000m long and can travel at over 250mph.
- Like most winds they occur where there is a contrast between hot and cold.
- Jet streams occur around the joins of tropical and polar air.



Be sure to visit the Training and CCC INTRANET pages for more information.

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